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Embryogenesis and oxygen consumption in benthic egg clutches of a tropical clownfish, *Amphiprion melanopus* (Pomacentridae)

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Abstract:

Variation in size at hatching is common in demersal spawning organisms, suggesting that processes during embryonic development may be critical in determining growth and development. To examine critical periods during embryonic development in the demersal spawning reef fish *Amphiprion melanopus*, the rate of oxygen consumption within an egg clutch was compared to morphological changes in the embryos. Oxygen consumption was least on day 1 of development where organ differentiation had not begun (mean $1.73 \pm 0.34 \times 10^{-5} \mu\text{mol O}_2 \text{ egg}^{-1} \text{ s}^{-1}$). Tail movement throughout the perivitelline fluid began on day 3 and is likely to assist in moving oxygen around the embryo, complementing diffusive transport. The appearance of haemoglobin in the blood corresponded to a peak in oxygen consumption on day 4, where the highest mean rate of oxygen consumption was recorded ($6.73 \pm 0.82 \times 10^{-5} \mu\text{mol O}_2 \text{ egg}^{-1} \text{ s}^{-1}$). This could be a critical period in development whereby risk of mortality is increased through increased embryo requirements at developmental thresholds.

Key-words: Critical period, developmental biology, micro-optode, respiration